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CASE PPD 50661/C1

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October 12, 2004
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF

ART UNIT: 1616

CORNES, DEREK

EXAMINER: CLARDY, S.

APPLICATION NO: 10/658,697

CONFIRMATION NO. 3154

FILED: SEPTEMBER 9, 2003

FOR: **HERBICIDAL COMPOSITION**

MAIL STOP PATENT APPLICATION

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

CLAIM OF PRIORITY UNDER 35 USC §119

Sir:

Applicant in the above-identified application hereby claims priority under the International Convention of Application No. GB 0114198.5, filed on June 11, 2001. This application is acknowledged in the Declaration of the instant case.

The certified copy of said application is submitted herewith.

Respectfully submitted,

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INVESTOR IN PEOPLE

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Cardiff Road
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Signed *Andrew Gwynne*
Dated 17 APR 2002

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Patents Act 1977
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11 JUN 2001

Request for grant of a patent

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1/77

12JUN01 E636380-2 D22093
P01/7700 0.00-0114198.5

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

1. Your reference

PPD 50661/GB/P

2. Patent application number

(The Patent Office will fill in this part)

11 JUN 2001

0114198.5

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Syngenta Limited
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UNITED KINGDOM

Patents ADP number (if you know it)

6254007002

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

08038028001

4. Title of the invention

HERBICIDAL COMPOSITION

5. Name of your agent (if you have one)

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10 "Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Patents ADP number (if you know it)

07991847002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
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Description 8

Claim(s) 2

Abstract 1

Drawing(s)

10. If you are also filing any of the following, state how many against each item.

Priority documents


Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.
Syngenta Limited
Signature  Date 11 June 01
Authorised Signatory

12. Name and daytime telephone number of person to contact in the United Kingdom
Julie Anne Bowdich 01344 414102

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HERBICIDAL COMPOSITION

The present invention relates to a herbicidal composition containing (A) mesotrione
5 and (B) a second herbicidal compound. The invention also relates to a method of controlling
the growth of undesirable vegetation, particularly in crops, using this composition.

The protection of crops from weeds and other vegetation that inhibits crop growth is
a constantly recurring problem in agriculture. To help combat this problem, researchers in
the field of synthetic chemistry have produced an extensive variety of chemicals and
10 chemical formulations effective in the control of such unwanted growth. Chemical herbicides
of many types have been disclosed in the literature and a large number are in commercial
use.

In some cases, herbicidal active ingredients have been shown to be more effective in
combination than when applied individually, and this is referred to as "synergism." As
15 defined in the *Herbicide Handbook* of the Weed Science Society of America, Seventh
Edition, 1994, page 318, "'synergism' [is] an interaction of two or more factors such that the
effect when combined is greater than the predicted effect based on the response to each
factor applied separately." The present invention is based on the discovery that mesotrione
and certain other herbicides display a synergistic effect when applied in combination.

20 The herbicidal compounds forming the synergistic composition of this invention are
independently known in the art for their effects on plant growth. They are all disclosed in
The Pesticides Manual, Twelfth Edition, 2000, published by The British Crop Protection
Council. They are also commercially available.

The present invention relates to a synergistic herbicidal composition comprising;

25 (A) mesotrione, and:

(B) a second herbicide selected from;

(B1) triazines

(B2) triazolinones

(B3) triazinones

- (B4) imidazolinones
- (B5) dicamba
- (B6) flumetsulam
- (B7) trifloxysulfuron
- 5 (B8) tritosulfuron
- (B9) triasulfuron
- (B10) pyriftalid
- (B11) prosulfocarb
- (B12) pretilachlor
- 10 (B13) cinosulfuron

or their herbicidally effective salts.

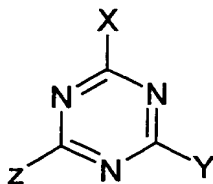
The synergistic compositions of the present invention can provide one or more of a number of advantages over the use of the individual components (A) and (B). The rates of application of the individual components can be markedly reduced while maintaining a high level of herbicidal efficacy. The composition can have a considerably broader weed spectrum against which it is effective than does either of the components alone. The composition can have the potential to control weed species at a low application rate at which the individual compounds alone were ineffective. The composition can have a speed of action which is faster than that which would have been predicted from the speed of the individual components.

The composition contains a herbicidally effective amount of a combination of component (A) and component (B). The term "herbicide" as used herein means a compound that controls or modifies the growth of plants. The term "herbicidally effective amount" means the quantity of such a compound or combination of such compounds that is capable of producing a controlling or modifying effect on the growth of plants. Controlling or modifying effects include all deviation from natural development, for example: killing, retardation, leaf burn, albinism, dwarfing and the like. The term "plants" refers to all

physical parts of a plant, including seeds, seedlings, saplings, roots, tubers, stems, stalks, foliage, and fruits.

Mesotrione can be used in the form of a salt or metal chelate, such as a copper chelate. Most preferably, the mesotrione is in the form of a copper chelate. Metal chelates of mesotrione and their preparation are known and described in US 5 912 207.

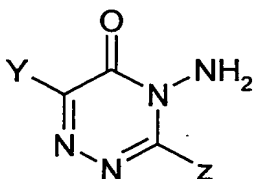
Triazines are compounds of the general formula;



in which X is selected from halo, C1-6 alkoxy, or C1-6 alkylmercapto, Y and Z are independently selected from C1-6 alkylamino, C1-6 dialkylamino. Preferably X is chloro, methylmercapto or methoxy. Preferably Y and Z are independently ethylamino, isopropylamino, or tertiarybutylamino. Examples of triazines are ametryne, atrazine cyanazine, desmetryne, dimethametryne, prometon, prometryne, propazine, terbumeton, terbutryne trietazine, terbuthylazine, simazine and simetryne. Most preferably the triazine is terbuthylazine or simazine.

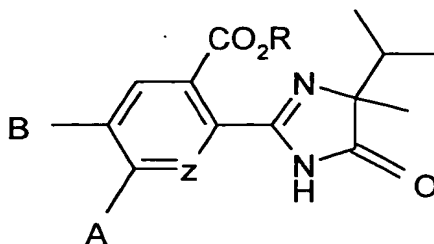
Triazolinones are compounds such as amicarbazone.

Triazinones are compounds such as hexazinone or compounds of formula;



in which Y is an alkyl, for example C1-8 alkyl, preferably C2-6 alkyl, or Y is cycloalkyl, for example C5-7 cycloalkyl, preferably cyclohexyl, or Y is aryl, for example phenyl, and Z is alkyl, for example C1-6 alkyl, preferably methyl, or Z is alkoxy or alkyl thio, for example C1-6 alkoxy or C1-6 alkylmercapto, preferably methylmercapto. Examples of triazolinones are metamiltron, and metribuzin.

Imidazolinones are compounds of formula;



in which Z is CH or N, B is H, C1-6 alkyl, or C1-6 alkoxy C1-6 alkyl, B is H, or A and B together form an aromatic ring.

Preferably Z is N. Preferably B is methyl, ethyl or methoxyethyl, or A and B are an unsubstituted aromatic ring. Examples of imidazolinones are imazapic, imazapyr, imazamethabenz-methyl, imazaquin, imazamox and imazethapyr

Dicamba can be in the form of a salt such as a sodium, potassium or ammonium salt.

Trifloxysulfuron can be in the form of a salt, such as a sodium salt.

Preferably, component (B) is terbuthylazine, simazine, dicamba, flumetsulam, imazamox, imazapyr, imazethapyr, metribuzin, trifloxysulfuron or pyriftalid, with terbuthylazine and simazine being especially preferred.

The invention also relates to a method of controlling the growth of undesirable vegetation, particularly in crops, and to the use of this synergistic composition.

The species spectrums of the compounds (A) and (B), i.e., the weed species that the respective compounds control, are broad and highly complementary. Mesotrione controls most broadleaf weeds and a few grass weeds, and compounds (B) control most grass weeds and a few or some broadleaf weeds. The species spectrum for individual compounds within the scope of each formula varies to some extent. It has been surprisingly found, however, that a combination of a compounds (A) and (B) exhibits a synergistic action in the control of many common weeds.

In the compositions of this invention, the weight ratio of component (A) to component (B) at which the herbicidal effect is synergistic lies within the range of between about 32:1 and about 1:20. Preferably, the weight ratio of component (A) to component (B) is between about 8:1 and 1:15, with a weight ratio of between about 4:1 and about 1:10 being especially preferred.

The synergistic herbicidal compositions of this invention preferably also comprise an agriculturally acceptable carrier therefor. In practice, the composition is applied as a formulation containing the various adjuvants and carriers known to or used in the industry for facilitating dispersion. The choice of formulation and mode of application for any given compound may affect its activity, and selection will be made accordingly. The compositions of the invention may thus be formulated as granules, as wettable powders, as emulsifiable concentrates, as powders or dusts, as flowables, as solutions, as suspensions or emulsions, or as controlled release forms such as microcapsules. These formulations may contain as little as about 0.5% to as much as about 95% or more by weight of active ingredient. The optimum amount for any given compound will depend upon formulation, application equipment, and nature of the plants to be controlled.

Wettable powders are in the form of finely divided particles that disperse readily in water or other liquid carriers. The particles contain the active ingredient retained in a solid matrix. Typical solid matrices include fuller's earth, kaolin clays, silicas and other readily wet organic or inorganic solids. Wettable powders normally contain about 5% to about 95% of the active ingredient plus a small amount of wetting, dispersing, or emulsifying agent.

Emulsifiable concentrates are homogeneous liquid compositions dispersible in water or other liquid, and may consist entirely of the active compound with a liquid or solid emulsifying agent, or may also contain a liquid carrier, such as xylene, heavy aromatic naphthas, isophorone and other non-volatile organic solvents. In use, these concentrates are dispersed in water or other liquid and normally applied as a spray to the area to be treated. The amount of active ingredient may range from about 0.5% to about 95% of the concentrate.

Granular formulations include both extrudates and relatively coarse particles, and are usually applied without dilution to the area in which suppression of vegetation is desired. Typical carriers for granular formulations include sand, fuller's earth, attapulgite clay, bentonite clays, montmorillonite clay, vermiculite, perlite and other organic or inorganic materials which absorb or which can be coated with the active compound. Granular formulations normally contain about 5% to about 25% active ingredients which may include surface-active agents such as heavy aromatic naphthas, kerosene and other petroleum fractions, or vegetable oils; and/or stickers such as dextrans, glue or synthetic resins.

Dusts are free-flowing admixtures of the active ingredient with finely divided solids such as talc, clays, flours and other organic and inorganic solids that act as dispersants and carriers.

Microcapsules are typically droplets or granules of the active material enclosed in an inert porous shell which allows escape of the enclosed material to the surroundings at controlled rates. Encapsulated droplets are typically about 1 to 50 microns in diameter. The enclosed liquid typically constitutes about 50 to 95% of the weight of the capsule, and may include solvent in addition to the active compound. Encapsulated granules are generally porous granules with porous membranes sealing the granule pore openings, retaining the active species in liquid form inside the granule pores. Granules typically range from 1 millimeter to 1 centimeter, preferably 1 to 2 millimeters in diameter. Granules are formed by extrusion, agglomeration or prilling, or are naturally occurring. Examples of such materials are vermiculite, sintered clay, kaolin, attapulgite clay, sawdust and granular carbon. Shell or membrane materials include natural and synthetic rubbers, cellulosic materials, styrene-butadiene copolymers, polyacrylonitriles, polyacrylates, polyesters, polyamides, polyureas, polyurethanes and starch xanthates.

Other useful formulations for herbicidal applications include simple solutions of the active ingredient in a solvent in which it is completely soluble at the desired concentration, such as acetone, alkylated naphthalenes, xylene and other organic solvents. Pressurized sprayers, wherein the active ingredient is dispersed in finely-divided form as a result of vaporization of a low boiling dispersant solvent carrier, may also be used.

Many of these formulations include wetting, dispersing or emulsifying agents. Examples are alkyl and alkylaryl sulfonates and sulfates and their salts; polyhydric alcohols; polyethoxylated alcohols; esters and fatty amines. These agents, when used, normally comprise from 0.1% to 15% by weight of the formulation.

Each of the above formulations can be prepared as a package containing the herbicide together with other ingredients of the formulation (diluent, emulsifiers, surfactants, etc.). The formulations can also be prepared by a tank mix method, in which the ingredients are obtained separately and combined at the grower site.

These formulations can be applied to the areas where control is desired by conventional methods. Dust and liquid compositions, for example, can be applied by the use

of power-dusters, broom and hand sprayers and spray dusters. The formulations can also be applied from airplanes as a dust or a spray or by rope wick applications. To modify or control growth of germinating seeds or emerging seedlings, dust and liquid formulations can be distributed in the soil to a depth of at least one-half inch below the soil surface or applied to the soil surface only, by spraying or sprinkling. The formulations can also be applied by addition to irrigation water. This permits penetration of the formulations into the soil together with the irrigation water. Dust compositions, granular compositions or liquid formulations applied to the surface of the soil can be distributed below the surface of the soil by conventional means such as disking, dragging or mixing operations.

If necessary or desired for a particular application or crop, the composition of the present invention may contain an antidotally effective amount of an antidote for component (A) or component (B). Those skilled in the art will be familiar with suitable antidotes. Examples of suitable antidotes are benoxacor and cloquintocet mexyl.

Further, other biocidally active ingredients or compositions may be combined with the synergistic herbicidal composition of this invention. For example, the compositions may contain, in addition to components (A) and (B), insecticides, fungicides, bactericides, acaracides or nematocides, in order to broaden the spectrum of activity.

As one skilled in the art is aware, in herbicidal testing, a significant number of factors that are not readily controllable can affect the results of individual tests and render them non-reproducible. For example, the results may vary depending on environmental factors, such as amount of sunlight and water, soil type, pH of the soil, temperature, and humidity, among other factors. Also, the depth of planting, the application rate of individual and combined herbicides, the application rate of any antidote, and the ratio of the individual herbicides to one another and/or to an antidote, as well as the nature of crops or weeds being tested, can affect the results of the test. Results may vary from crop to crop within the crop varieties.

Although the invention has been described with reference to preferred embodiments and examples thereof, the scope of the present invention is not limited only to those described embodiments. As will be apparent to persons skilled in the art, modifications and adaptations to the above-described invention can be made without departing from the spirit and scope of the invention, which is defined by the appended claims.

WHAT IS CLAIMED IS:

1. A synergistic herbicidal composition comprising;
(A) mesotrione, and:
 - 5 (B) a second herbicide selected from;
 - (B1) triazines
 - (B2) triazolinones
 - (B3) triazinones
 - (B4) imidazolinones
 - 10 (B5) dicamba
 - (B6) flumetsulam
 - (B7) trifloxysulfuron
 - (B8) tritosulfuron
 - (B9) triasulfuron
 - 15 (B10) pyriftalid
 - (B11) prosulfocarb
 - (B12) pretilachlor
 - (B13) cinosulfuron
- or their herbicidally effective salts.
- 20 2. An herbicidal composition according to claim 1, wherein component (B) is terbuthylazine, simazine, dicamba, flumetsulam, imazamox, imazapyr, imazethapyr, metribuzin, trifloxysulfuron or pyriftalid.
3. An herbicidal composition according to claim 1, wherein the weight ratio of component (A) to component (B) is between about 32:1 and about 1:20.

4. An herbicidal composition according to claim 3, wherein the weight ratio of component (A) to component (B) is between about 8:1 and 1:15.
5. An herbicidal composition according to claim 4, wherein the weight ratio of component (A) to component (B) is between about 4:1 and about 1:10.
- 5 6. A method for controlling undesirable vegetation, comprising applying to the locus of such vegetation a herbicidally effective amount of a composition as claimed in claim 1
7. A method according to claim 8, wherein the combined amount of components (A) and (B) applied to the locus of the undesirable vegetation is between about 0.005 kg/ha and about 5.0 kg/ha.
- 10 8. A method according to claim 7, wherein the combined amount of components (A) and (B) applied to the locus of the undesirable vegetation is between about 0.5 kg/ha and 3.0 kg/ha.
9. A method according to claim 8, wherein the combined amount of components (A) and (B) applied to the locus of the undesirable vegetation is at least 1.0 kg/ha, and wherein at
15 least 0.02 kg/ha of component (A) is applied to the locus of the undesirable vegetation.

ABSTRACT

Herbicidal Composition

5 The present invention relates to a synergistic herbicidal composition comprising;

(A) mesotrione, and:

(B) a second herbicide selected from; (B1) triazines (B2) triazolinones (B3) triazinones (B4) imidazolinones (B5) dicamba (B6) flumetsulam (B7) trifloxysulfuron (B8) tritosulfuron (B9) triasulfuron (B10) pyriftalid (B11) prosulfocarb (B12) pretilachlor (B13) cinosulfuron, or
10 their herbicidally effective salts.

A method of controlling the growth of undesirable vegetation, particularly in crops, using this synergistic composition is also disclosed.